Digital Logic Design
[2EC303]

Elevator Weight Manager

-: Made by :-

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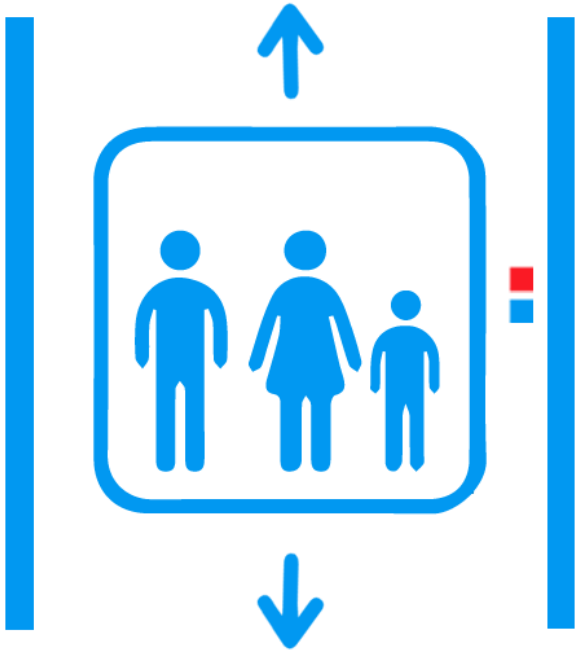
Elevator weight Manager



Introduction to Project

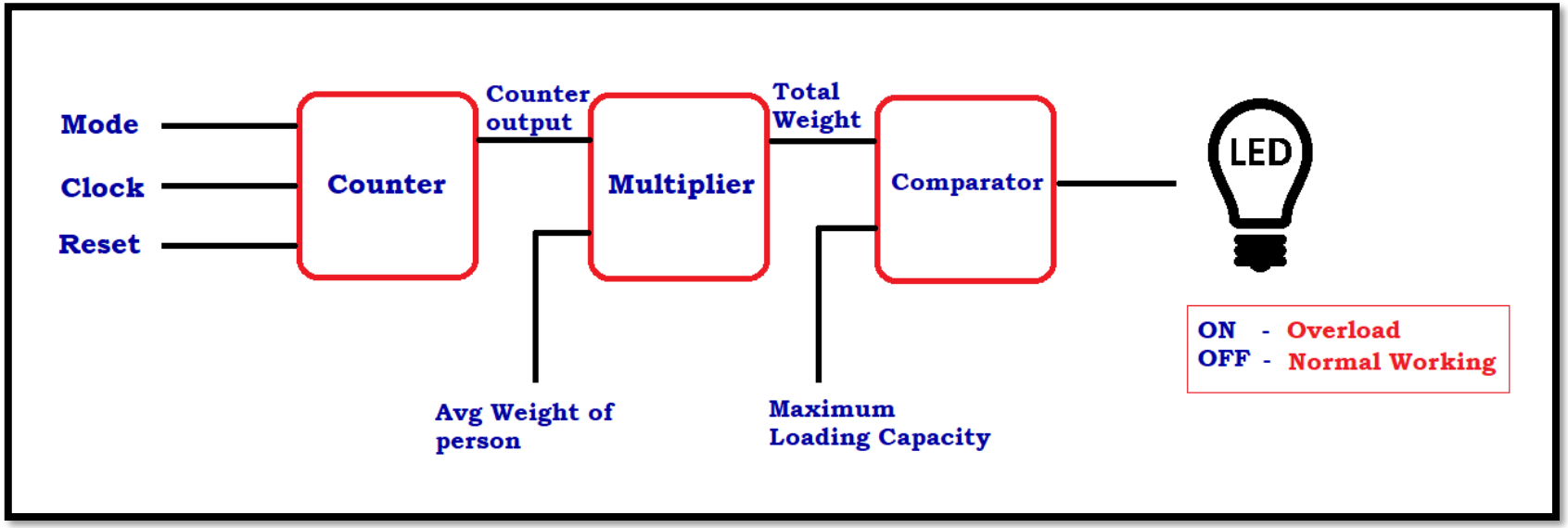
- The basic elements used in project :-

1 . 4 bit Mod Counter

2 . 4 bit Multiplier

3 . 8 bit Comparator

Schematic Working of Elevator weight Manager



Working

From the block diagram, let us describe the whole flow of elevator weight manager.

- To begin with, mode, reset and clock (input by IR sensor)are the inputs given to counter which counts the number of passengers in lift and gives output called counter output. If mode =1 (also called up mode), means that the number of passengers are increasing in the elevator. Similarly if mode =0 (also called down mode), means that the number of passengers are decreasing in the elevator. If reset =1 , the counter will give output as zero.

Working

- In addition, multiplier has two inputs , one is the counter output and second is the average weight of single passenger. These two inputs are multiplicands which are multiplied by multiplier producing output in the form of total weight.

- In conclusion, two inputs namely total weight and maximum capacity of elevator are compared using comparator to get final output. If total weight is more than maximum capacity -> final output =1 which shows that elevator is overloaded and led glows . If total weight is less than maximum capacity -> final output =0 which shows that elevator is not overloaded and led does not glow.

Counters

Counters are group of flip-flops. Counters are used to count specific things required as per the need, they are sequential circuits and digital counters counts the pulses, there are many different types of digital counters like Asynchronous Counters, Synchronous Counters, Mod Control Counters, etc. Here we have used 4-bit mod controlled synchronous counter and we also have reset option in it from which we can clear the output of counter or basically the flip-flops used in it. We have made mod controlled counter so the input mode works as when it logic 1 it counts as Up-Counter and for logic 0 it counts as Down-Counter

Truth Table

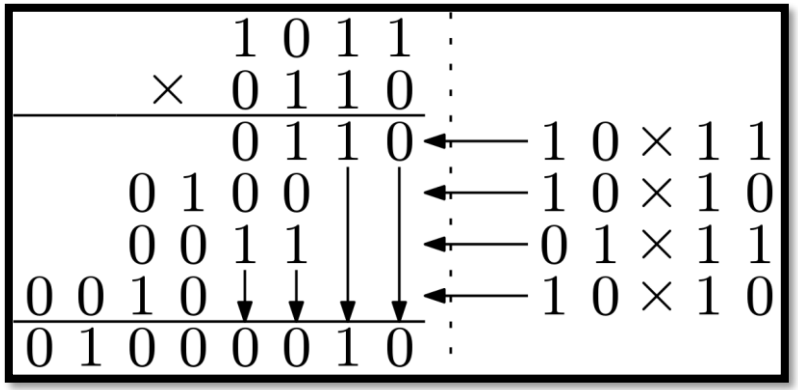
Mod=1 => Up counter **Mod=0 => Down counter**

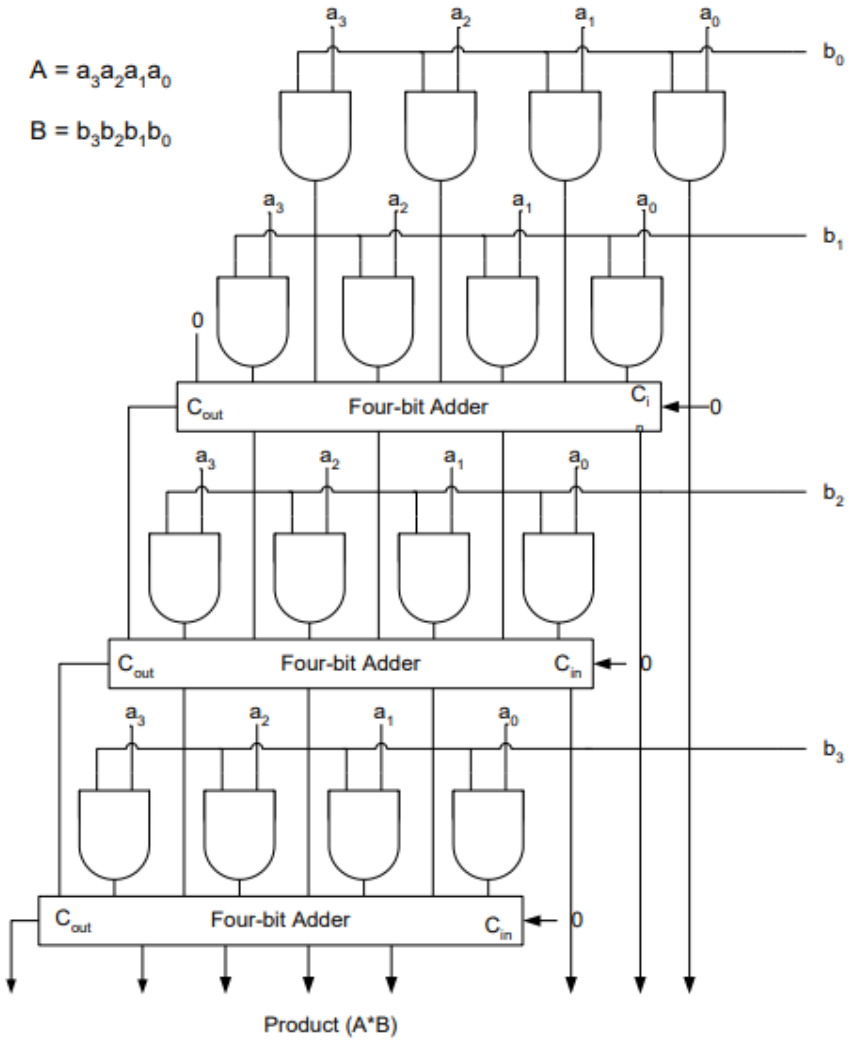
Present state	Next state	Present state	Next state
0000	0001	0000	1111
0001	0010	0001	0000
0010	0011	0010	0001
0011	0100	0011	0010
0100	0101	0100	0011
0101	0110	0101	0100
0110	0111	0110	0101
0111	1000	0111	0110
1000	1001	1000	0111
1001	1010	1001	1000
1010	1011	1010	1001
1011	1100	1011	1010
1100	1101	1100	1011
1101	1110	1101	1100
1110	1111	1110	1101
1111	0000	1111	1110

Multiplier

A digital multiplier is a combinational logic circuit used to multiply two numbers. The two numbers which are being multiplied are called multiplicand and the output of the multiplication is called product. They are made with the help of half-adders, full-adders and logic gates. In multipliers first the single bits of multiplier and all the bits of multiplicand are passed by AND gates then same follows for other bits of multiplicand then they are passed to adders and sequential partial products are formed after shifting after each bit of multiplier and then they are passed to adders for addition. The whole process is done as first partial products a0b0, a0b1, a1b0, a1b1 are formed by means of AND gate then adders are used and added by shifting the next bits of each partial products as c0, c1, c2, c3 are generated here with the help of adders.

4-Bit Multiplier

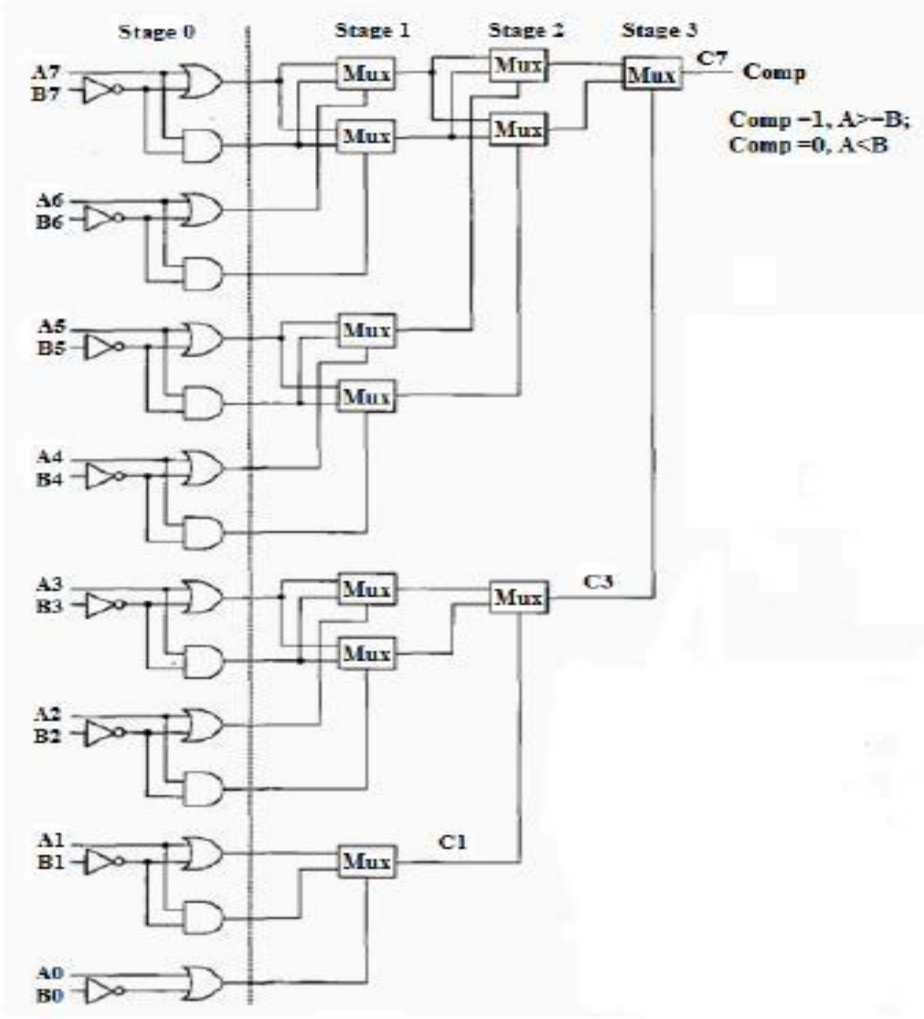




Comparators

Digital comparators takes two numbers as input and provide the output according to which number is greater or smaller. We manually can check it by calculating the magnitude/decimal equivalent of the numbers, while here we calculate as we start from most significant bit and move towards lowest significant bits of both the numbers while doing this we check if the number are same we move to next low bit or if they are not same then we check which bit is greater and according that number is greater. This work can be done by XNOR gate as we have to find the unequal bits from higher to lowest significant bits and XNOR gate is inequality detector so wherever unequal bits will be founded at that bit we can say the number having that bit 1 is greater than the other number. These thing can also be done with the help of IC7485 which is a 4bit comparator IC

8 – bit Comparators



Conclusion

- The project was designed using Quartus 13.0sp1 and simulated using Model Sim Altera.
- The result of the project was verified and the Led is active when the Elevator is Overloaded.